CEMEX: ENVIRONMENTAL MONITORING PROCEDURES

October 2021 (v1.4)

AMENDMENT LOG

DATE	VERSION NUMBER	AMENDMENTS
25 Feb 2020	v1.0	
9 April 2020	v1.1	Added appendices with sample bottle containers and ALS COC
17 April 2020	v1.2	Added EDGE generated COC
3 Dec 2020	v1.3	Edited Section 3.5 to include reference to footpegs on waterra pump.
27 Oct 2021	V1.4	Added FID Survey procedures

Table of Contents

APPENDIX 3 Example Cemex COC created by Edge to be returned with samples to the laboratory

APPENDIX 4 FID Survey Procedures

1 INTRODUCTION

This document contains procedures for the monitoring of gas (Section 2), groundwater (Section 3), leachate (Section 4) and surface water (Section 5) at CEMEX sites.

Where locations are to be monitored for gas, water level and water/leachate samples are to be taken the work must be undertaken in the following order:-

1. **Gas monitoring**
2. **Water/leachate level**
3. **Water/leachate sampling**

This is to ensure that the gas monitoring is carried out before the monitoring location is opened up to the atmosphere which would dilute the gases.

All field data collected at Cemex sites is entered into the Earthsoft Edge software on Toughbooks or Toughpads (ruggedised for external use) for direct import to the Earthsoft Equis database. Not only field data is entered but also field observations to capture significant information about the monitoring round.

For specific detailed information on the use of the Edge software refer to the latest version of the Cemex Edge User Manual, which is available at

https://cemexhelp.equisonline.com/EDGE_USER_NOTES/

NOTE ON USE OF ACTIVITIES in EDGE

The software is designed to both instruct technicians on what is required at each site visit as well as to enable recording of what actually took place. More detail is provided in the link above and where appropriate particular actions are described in the monitoring instruction below.

However, for activities it is ESSENTIAL that these questions are used as a location condition audit. They must be completed in real time, in the sequence provided and in the following way:

1. **On arrival at the location, answer those question relating to the first inspection, e.g. location accessible?, labelled?, locked on arrival? etc. If there are issues that mean the answer is not yes, change the default yes to no and then ADD A COMMENT to describe what the problem or observation is**
2. **Use the activity questions to trigger action and confirm yes once the task is complete, e.g. water level, gas reading, or answer no if it could not be completed and add a comment explaining why. Note that where for example a water level could not be made, the activity record should reflect that but so must the water level record itself**
3. **Complete other condition questions as the work is completed, e.g. is the location locked on departure, but use the question as a prompt to CHECK and then confirm.**

2 GAS MONITORING

2.1 General

Landfill gas monitoring will be undertaken by personnel trained in the use of the monitoring equipment and familiar with the monitoring procedures set out below.

All equipment will be maintained and calibrated in line with manufacturers' recommendations.

Each borehole should be inspected during each routine monitoring visit to ensure that all installations are undamaged and functioning correctly. If any damage or defect is found the details will be recorded and remedial measures implemented as soon as practicable.

In particular with gas monitoring it is VITAL that the sample points are airtight (i.e. sealed from the atmosphere) before and after sampling. You must complete the questions in the **Activities** worksheet in the Edge file relating to Airtightness.

Ensure that monitoring of each borehole is representative of the gases in the ground. Gases present may not be representative of the ground atmosphere on the day of sampling since they may have become stratified or "stagnant".

Ensure that sufficient time is allowed for monitoring each location to enable fresh gases to be drawn into the well. The period of pumping will vary from each well depending on its size and depth. It is important to wait until a stable reading is observed which may take several minutes.

Ensure that 'fresh' air is not drawn into the well during the sampling process. The well should be fitted with a removable but airtight cap that contains an integral gas-sampling tap. A safe system of work should be observed; personnel must wear protective clothing and not smoke in the vicinity of the monitoring point.

2.2 Monitoring Equipment

- GA5000 (landfill gas meters). Check the certificate to ensure the instrument is calibrated;
- Panasonic Toughbook or Toughpad running the Earthsoft EDGE software, and with spare fully charged batteries; and,
- Equipment for accessing boreholes (e.g. keys, spanners, screwdrivers, etc); Consider carrying a small can of WD40 or equivalent for lock and hinge easing **BUT DO NOT CONTAMINATE SAMPLES**.

The GA5000 equipment is certified ATEX, IECEx, CSA, MCERTS and UKAS calibration (ISO17025) and the other equipment will conform to BS6020 or certified to BASEEFA certification standard SFA 3007/1981.

2.3 Pre-Sampling Procedures (in advance of site visit)

1. Open the relevant EDGE file for the site and month/year provided by Cemex on the Field Computer (Panasonic Toughbook).
2. Check the landfill gas monitoring instrument(s) to ensure that they are within their calibration dates as defined by the manufacturer. Also check that the machine can be zeroed properly (see item 6 in Section 2.4).
3. Load the appropriate site monitoring gas file (format Sitename.dve) onto the gas machine from the GAMS software on the Toughbook so that the complete list of monitoring locations

for the site being visited is available. Only one site is to be loaded at a time to the gas machine.

4. Check the battery life of each instrument & the field computer is sufficient for the sampling round.
5. Check that the gas equipment filters are clean and dry, if not then replace them.
6. Check that sampling tubing on each instrument is clean, dry and capable of making a good seal on the sampling taps, if not then replace it.
7. Take a data recording device (Toughbook) and a notebook as backup.
8. Ensure that the sampler has the means to gain access to the monitoring points that require sampling (e.g. keys, spanners, screwdrivers etc.). Ensure that where rubber tubing is used on sites to seal multi-level gas samplers that spare rubber tubing is available to replace damaged or lost seals e.g. Farnham, Bletchingley.
9. At the start of each day run the 'fresh air' program on the GA5000 analyser at a location where landfill gas is unlikely to be found.
10. **Setting the Required Gas Flow Parameters for all locations**

Cemex require that wherever gas flow readings are to be taken they should be the Average flow over a 1-minute sample period.
Each gas machine should be set for this whenever it is used on a Cemex site. This is done in the following way: -

- Select SPECIAL ACTION option - Select option 4 for FLOW - Select FLOW OPTIONS
- Press Button 1 until screen shows Flow Options of AVERAGE (i.e. NOT Snapshot or Peak)
- Press Button 2 for Duration (mins) and Press 1 (for 1 mins)
- Press Enter then Press Exit

2.4 Gas Monitoring Procedure

1. On each and every site visit where gas is to be monitored check the calibration of the gas monitoring instrument against a calibration gas can at the start **and end** of each monitoring visit and enter the calibration information on the Equipment Calibration Worksheet on the Edge file.
2. Check the monitoring location, time and reference number and select the correct location record in EDGE in the Location Chooser/Filter section on the left-hand side of the Edge file by clicking on it. Ensure the Filter by Selection box is ticked. When you have done this the worksheets in the Edge file that require entries for this location will have their Tabs highlighted RED.
3. At each monitoring point check the location is correctly labelled, its appearance and condition of the cover; and whether the cap / gas sampling tap is airtight both before and after sampling and note any damage or unusual occurrence. Complete all the questions relevant to before sampling in the **Activities** worksheet in Edge, and if there are any problems add a comment against "Other Issues" with a Y and a description of the problem. Check if GAS FLOW measurements are required at the location.
4. For gas monitoring locations note that the gas tap should be left in the closed position after monitoring; note if this is cannot be done for any reason enter a comment under Airtightness on Departure questions in the **Activities**.

5. NOTE: In a few limited circumstances where the monitoring point is also connected to a datalogger it may be necessary to leave a gas tap valve open to ensure gas can flow to the datalogging instrument. Where this is the case, special instructions will be issued.

6. Check that there is no water in the tip of the gas tap. If there is this must be cleared before monitoring; this must be recorded. Damage must be reported as soon as possible and arrangements for repair or replacement actioned. Enter any comments on the **Activities** worksheet against Other Issues in EDGE for that location.

The following are instructions for using a GA5000 instrument.

7. Switch on the gas meter, select the appropriate borehole ID, and having allowed it to warm up take a sample of fresh air to "zero" the meters. Ensure that the reading is zero for methane (CH4) and carbon dioxide (CO2); the reading for oxygen (O2) in fresh air should be approximately 21%. If the machine will not zero properly please contact your team manager to discuss whether to continue with the monitoring.

8. The order of taking readings has changed with the GA5000 compared to other instruments – and Cemex require the readings to be taken in the following order – which is slightly different to that given in the GA5000 Manual (which suggest the Flow reading is taken last – which is clearly wrong!). This is the suggested order and layout of tubing if flow readings are being taken.

   - **Relative Pressure** – clear tubing connected to **White Port** with in-line filter
   - **Gas Flow** – blue tubing connected to **Blue Port** - NO in-line filter
   - **Gas Readings** – clear tubing connected to **White Port** with in-line filter

9. Connect the sample tubing to the SAMPLE-IN (**White Port** *on the GA5000 device*] to the sampling tap on the borehole ensuring that the tubing is tightly sealed around the tap.

10. *On the GA5000 select '**RELATIVE PRESSURE"** from the gas reading screen* Open the borehole gas tap and wait until the relative pressure reading has stabilised, and then CLOSE the borehole gas tap. Remove the tubing from the **White Port** and connect it to the **Blue Port** if taking a flow reading – OR just switch to the Blue tubing and Blue port.

11. To take a FLOW READING (**Blue Port**) select the Special Operations key below the screen. Then Select key 4 for Flow – Then select Zero Flow to zero the reading if necessary, with the tubing not connected to the sample point. Reconnect the tubing to the borehole gas tap – open the gas tap and Select START to commence flow reading. Allow the timer to continue for 1 minute, and then press STORE.

12. The screen will revert back to the Gas reading screen and should have a fixed Relative Pressure and Flow reading showing on the right-hand side. Close the borehole gas tap and move the sample tubing back to the **White Port** and open the gas tap.

13. Select the **Gas Readings** option below the screen, and the pump will turn on, and gas readings will appear on the left-hand side of the screen. Allow the gas readings to stabilise, for at least 1 minute, or more if the readings have not stabilised. Accept the gas readings by pressing STORE to store all gas readings.

14. If the CO2 or CH4 readings have not reached a steady value after three minutes (i.e. continue to vary by ±0.5% v/v), continue for a maximum of 10 minutes total sampling time if the readings are still increasing for CH4 and/or CO2. Observe the time taken to reach steady values. If values are still not steady record the values at 10 minutes.

15. Once the STORE button is pressed the gas machine will store the relative pressure and flow readings and also store two sets of gas readings for that location a) the Peak CH4 and CO2 and minimum O2 readings, and b) the final gas readings when STORE is pressed.

16. After the readings have been taken, close the gas tap and disconnect the instrument. Return to the **Activities** worksheet on the Toughbook and complete the Airtight on Departure question, which will give that action a date and time stamp. Use this as a reminder to check that the tap has been closed, i.e. don't just complete this question but visually confirm the tap is closed as well

17. It is possible for the meter to suck up water from the boreholes. The tubing must be carefully watched during sampling and should this happen the tubing should be immediately disconnected from the gas tap and the meter pump stopped. A qualifier should be entered to show there was a flow fail. If the filter is wet, then replace it with a dry filter. Water should be removed from the tubing before it is used again.

18. If it is **not possible to take a gas reading** from a location **for any reason** – a reading **MUST** be entered against the gas monitoring location by taking a gas reading in air, select **Relative Pressure**, then **Gas Readings** when the pump will come on. Turn the pump off, and Select **Special Action** from the options beneath the screen, then select **Site Questions**, and a list of possible qualifiers will be presented, select the most relevant qualifier to explain why it was not possible to obtain a reading (see Table 1 at bottom of this section for a list of the possible qualifiers):

    e.g. FF for flow fail, IA for inaccessible and then STORE the reading.

19. If for example an entire area of the site was inaccessible due to the site being flooded – enter gas readings against ALL of the affected gas monitoring locations and use the qualifier IA for inaccessible and then ALSO enter the same information onto the **Activities** Worksheet on the Toughbook with Accessible – enter N and then put a comment in the Remark column to say the whole site or area was underwater.

20. Move to the next monitoring location. **IMPORTANT -** Whilst moving between points it is useful to pump the meter with fresh air to remove any stored gases in the machine, particularly if the last monitoring point had high gas levels. It is not unknown for there to be carry over from one point to the next if the machine is not fully flushed with air. **ALWAYS** ensure that the readings on the machine are zero CH4 and CO2 and 21% O2 before connecting to the next point.

21. If other **Activities** are required at the location e.g. dips and samples proceed to next Sections.

22. At the end of the site visit – **check the gas calibration again** with a gas canister and enter the calibration data into the Equipment Calibration worksheet on the Toughbook.

Table 1 - TABLE OF GAS QUALIFIERS

Qualifier Code	Qualifier meaning
FF	Flow fail – when gas flow fails or it sucks up water
IA	Location inaccessible – cannot get to the monitoring point
IF	Instrument failure – i.e. gas machine failure
MD	Missed visit to this location – technician error
NF	Location could not be found
NG	Not tested as access to location not granted e.g. by landowner or quarry manager
ON	Occupier not at home
UR	Unreliable sample – technician suspects the recorded results are unreliable e.g. due to carry over from previous location
US	Unsafe to sample
UW	Sample location and/or monitoring point under water

2.5 FID Survey Procedures

Where FID surveys are required, the procedures outlined in Appendix 4 will be followed.

3 GROUNDWATER

3.1 Groundwater Monitoring and Sampling Procedure - General

Ensure that any gas monitoring (see Section 2) is undertaken before sampling.

Ensure that any sample taken is representative of the groundwater in the ground.

Ensure that sufficient time is allowed for sampling each monitoring point to enable fresh groundwater to be taken.

Ensure that the sample is not contaminated by the sampling procedure.

A safe system of work should be observed; personnel must wear protective clothing and not smoke in the vicinity of the monitoring point.

3.2 Pre-Sampling Procedures (in advance of site visit)

- Cemex staff are responsible for ordering the required pre-registered bottles and arranging with the laboratory (ALS) to have them delivered in good time to a location agreed with Enitial, this may be the site, the technicians home address, or other.
- When the bottles have been delivered, as soon as possible before the site visit, check the correct bottles have been delivered and that the pre-printed labels have the correct sample codes. There will be a laboratory Chain of Custody (COC) form with the delivery, see an example ALS Coventry COC in Appendix 2. Each sample is shown on the COC. Against each sample in the column headed “ALS containers” there is a box containing a list of numbers representing the bottle type references required for that sample. Appendix 1 shows a photograph of each of the bottle types referred to, so that you can match the number and type of bottles for each sample. **If any bottles are missing inform Cemex immediately**.
- It is Enitial’s responsibility to ensure a courier has been booked to collect the samples on the **same day they are taken**, either from the site, technician’s home or deliver them to a collection centre.
- Check the battery life of each instrument & the Toughbook is sufficient for the sampling round.

3.3 Monitoring Equipment

- Dip meter (a clean meter should be used for groundwater, and if monitoring leachate a separate dip meter, dedicated for this use, should be used for contaminated locations).
- Appropriate pre-registered sample bottles with any necessary preservatives / filtration equipment and instructions;
- Waterproof markers;
- Flexible hose;
- Bailer;
- Backpack Waterra pump if necessary;
- Graduated bucket;
- Panasonic Toughbook running the Earthsoft EDGE software (fully charged) and with spare fully charged batteries;
- Field Pen – for monitoring pH, EC and temperature plus calibration fluids

- Equipment for accessing boreholes (e.g. keys, spanners, screwdrivers, etc); Consider carrying a small can of WD40 or equivalent for lock and hinge easing **BUT DO NOT CONTAMINATE THE SAMPLES**;
- Clean water containers;
- Gloves and other relevant PPE;
- Waste-water container for contaminated locations if unable to discharge to ground;
- Cleaning fluids and cloths in case of contamination of dip tapes; and,
- Notebook and pen in case of Toughbook malfunction.

3.4 Groundwater Level Monitoring Procedure

- This is to be undertaken AFTER all gas flow and concentration readings have been taken.
- Lower the dip-meter probe until the buzzer sounds.
- Raise the probe slowly until the buzzer stops.
- Lower the probe slightly until the buzzer just begins to sound, i.e. measure on the activation of the buzzer when lowering the probe
- Read the level of groundwater below the datum point (usually the cover level of the steel casing protecting the borehole) from the tape and enter the result into the **Dip** field in the **Water Levels Tab** in the EDGE file. Check this dip on the hydrograph that shows the past one year's data (current dip is shown in red). Check that the dip looks sensible. If it does not, repeat the dip and update if necessary.
- Lower the probe to the base of the borehole and enter the level below the datum point into the **Plumb** field in EDGE. (Remember to make any allowance necessary if the end of the dip probe has an extension on the end.)
- In Edge in the Dip or Elevation column select Dip.
- If the borehole is DRY do NOT enter a value in the Dip column, but instead put a Tick in the Tick if Dry column, and enter the measured depth of well in the Plumb field
- Where artesian conditions are being measured, i.e. water levels above the top of a sealed cover, a pressure gauge should be used to measure the head above the cover. In this case the instrument type should be recorded as Pressure Gauge. **ARTESIAN CONDITION NOTE:** This is an elevation above the datum so the **DIP/ELEVATION** field should be set to **ELEVATION**

  NOTE: In boreholes where the water level can be artesian but is not always so, it is important to check whether it is artesian by opening the dipping port/sampling tube slowly to see if the water level comes up into it, if it doesn't then the water level reading should be a DIP. If the pressure gauge is used but it gives a negative number, it is incorrect and a DIP should be measured.
- If it is not possible to take a water level or plumb reading **for any reason**, enter a Qualifier from the pop-up list that appears in the Qualifier column (see Table below), and add a comment in the Qualifier Note column to provide more useful information.
- Complete the other columns for the Measurement Type, Equipment Code and Technician Name
- Remove from borehole. Check that the tape is clean, and, if not, clean before the next use.

- Save the EDGE file before moving onto the next location.

Table 2 - WATER LEVEL QUALIFIERS

Qualifier Code	Qualifier meaning
BL	Borehole is blocked
DM	Damaged headworks preventing access etc
FR	Location access frozen
IA	Location inaccessible – cannot get to the monitoring point
IF	Instrument failure – i.e. dipper malfunction or gauge board broken
MD	Missed visit to this location – technician error
NF	Location could not be found
NG	Not tested as access to location not granted e.g. by landowner or quarry manager
ON	Occupier not at home
US	Unsafe to sample
UW	Sample location and/or monitoring point under water

3.5 Groundwater Sampling Procedure

- Check the monitoring location and reference number and select the correct location in EDGE.
- Note anything unusual about the monitoring location, e.g. damage. Record this in the remark field of the EDGE field sample form, and in the **Activities** worksheet. If appropriate take a photograph of the damage, upload the photograph to EDGE and associate it with the location.
- The bottles should have pre-registered labels fixed to the bottles in most circumstances. If not, label the sample bottle and clearly write the sample code onto the label. The sample code must be the same as on the Field Samples sheet, Sample Code column given in EDGE.
- Dip the level to the groundwater and depth to the base of the borehole (plumb depth) in the monitoring well using dip meter (see above).
- Check if dedicated Waterra tubing is in the well, if not, use bailer. If borehole does not have a pedestal, then use the footpegs on the waterra pump to stand on.
- Calculate purge volume from measured depth of well minus depth to groundwater (i.e. length of water column) multiplied by the cross-sectional area of the borehole pipe (see Table 3). For a 50mm diameter pipe this works out as 2 litres of water for every 1 metre of length of the water column. So, a 5 metres water column would hold 10 litres of water.
- Purge volumes are normally based on purging three times the volume of water in the water column. Hence a 5 metres column of water in a 50mm diameter pipe would need to be purged of 30 litres to be purged three times.

Table 3 - CALCULATION OF PURGE VOLUMES

Diameter of borehole Pipe	Volume per metre of water column	Purge x 3 Volumes per metre of water column
50mm	2 litres	6 litres per metre
75mm	4.4 litres	13 litres per metre
100mm	8 litres	24 litres per metre
150mm	17.6 litres	53 litres per metre
200mm	31.4 litres	94 litres per metre
250mm	49 litres	147 litres per metre

- Begin pumping the Waterra/bailer to purge the borehole and measure the purged water volume in the graduated bucket.
- The Edge Field Samples sheet will show what type of purging is required in the Method column e.g. WAT X 1 (Purge one volume) or WAT X 3 (Purge 3 volumes). If the given instruction is not possible for any reason, amend the Method column to the method used, and put a comment in the Sample Comments column to say why the method was changed. In exceptionally deep boreholes, less than 3 well volumes may be a sufficient purge volume if electrical conductivity readings have been shown to stabilise and by prior agreement with CEMEX.
- Take Field readings (pH, Temperature, Electrical Conductivity) with the Field Pen from the sample in the bucket, before subsequently sampling directly into the sample bottles.
- **There may be a number of different bottles to be filled. Check that you have all the sample bottles for that location (as shown on the ALS COC – see Section 3.2) and that they all have the correct sample code on the pre-registered label that corresponds with the SAMPLE_ID in the Field Samples worksheet in Edge.**
- If field filtering is required by the laboratory, filter the sample directly into the sample bottles that do require filtering.
- Where there is no fixative wash out the sample bottles twice with water from the borehole to clear out any dust or other matter, and to “coat” the bottle with the sample water.
- In each case continue to fill each bottle until completely full and overflowing (except for samples with fixatives). Firmly close the bottle cap ensuring that the bottle does not contain any headspace (especially vials for volatiles).
- Enter sample details into the Field Samples Form in EDGE, complete all required columns. The date and time will default to the current date and time – check these are correct. Enter Field Pen readings.
- Enter a description of the sample e.g. its odour and colour, and anything unusual such the presence of foreign bodies etc and record in the appropriate field.
- Replace dedicated tubing in the well, replace gas tap and ensure it is shut, re-secure the borehole taking care to then CHECK this and record in the appropriate Activities tab at the time it is done. Then move to next position and repeat.
- Complete any remaining **Activities** questions on the worksheet in Edge before moving to the next location.

3.6 Groundwater, Surface Water, Discharge and Leachate Sampling Qualifiers for Samples Not Taken

If for any reason a sample cannot be taken then the TYPE column on the Field Samples sheet in Edge should be changed to NST (for No Sample Taken) and a Qualifier should be entered into the Qualifier Column, plus a more detailed comment in the Qualifier Note column. Relevant qualifiers are as follows: -

Table 4 - FIELD SAMPLE QUALIFIERS

Qualifier Code	Qualifier meaning
BL	Borehole is blocked
DM	Damaged headworks preventing access etc
DN	Discharge - None- no discharge occurring
DR	Borehole / surface water location dry
FO	Field analyte only
FR	Location access frozen
IA	Location inaccessible – cannot get to the monitoring point
IF	Instrument failure – i.e. dipper malfunction or gauge board broken
MD	Missed visit to this location – technician error
NB	No bottles delivered to site
NF	Location could not be found
NG	Not tested as access to location not granted e.g. by landowner or quarry manager
ON	Occupier not at home
PO	Purge borehole only
US	Unsafe to sample
UW	Sample location and/or monitoring point under water

3.7 Sample Storage and Delivery

Place the sample bottles into cool box. Sample temperature must be maintained below 10 ºC.

When all sampling has been completed (groundwater, surface water, leachate) use the EDGE Chain of Custody Manager to create the electronic Chain of Custody. Make sure each sample required for testing is selected along with each determinand group required and assign the schedule. This normally will entail adding Scheduled Samples to the COC in which case the determinand groups will already be available. Check the COC instructions in the Edge User Manual if in doubt.

Export the eCOC and check that it is correct. Print off the chain of custody from the portable printer to accompany the samples to the laboratory, see example presented in Appendix 3. Once back at the office, email the COC to the laboratory and the Cemex data managers for backup (see Section 6 for e-mail addresses) ENSURING that the Company name CEMEX and site name are included in the email subject.

Ensure that the courier is booked to collect samples on the same day as they are taken. Or arrange to deliver the samples to a collection hub on the day of sampling.

Before leaving site, make a note in the Field Samples tab in EDGE to record the date/time the samples are to be collected by the laboratory. If you are present when the samples are collected ensure that the person receiving completes the chain of custody record and retain a signed copy.

4 LEACHATE

4.1 Leachate Monitoring and Sampling Procedure - General

Ensure that any gas monitoring (see Section 2) is undertaken before sampling.

Ensure that the sample is not contaminated by the sampling procedure.

A safe system of work should be observed; personnel must wear protective clothing and not smoke in the vicinity of the monitoring point.

Ensure sample bottles have been delivered in sufficient cool boxes.

4.2 Pre-Sampling Procedures (in advance of site visit)

- Cemex staff are responsible for ordering the required pre-registered bottles and arranging with the laboratory (ALS) to have them delivered in good time to a location agreed with Enitial, this may be the site, the technicians home address, or other.
- When the bottles have been delivered, as soon as possible before the site visit, check the correct bottles have been delivered and that the pre-printed labels have the correct sample codes. There will be a laboratory Chain of Custody (COC) form with the delivery, see an example ALS Coventry COC in Appendix 2. Each sample is shown on the COC. Against each sample in the column headed “ALS containers” there is a box containing a list of numbers representing the bottle type references required for that sample. Appendix 1 shows a photograph of each of the bottle types referred to, so that you can match the number and type of bottles for each sample. **If any bottles are missing inform Cemex immediately**.
- It is Enitial’s responsibility to ensure a courier has been booked to collect the samples on the same day they are taken, either from the site, technician’s home or deliver them to a collection centre.
- Check the battery life of each instrument & the field computer is sufficient for the sampling round. Where appropriate carry spare batteries in the vehicle

4.3 Monitoring Equipment

- Leachate dip meter dedicated to leachate wells.
- Appropriate pre-registered sample bottles with any necessary preservatives / filtration equipment and instructions;
- Waterproof markers;
- Flexible hose;
- Bailer;
- Panasonic Toughbook running the Earthsoft EDGE software, and with spare fully charged batteries;
- Equipment for accessing boreholes (e.g. keys, spanners, screwdrivers, etc). Consider carrying a small can of WD40 or equivalent for lock and hinge easing **BUT DO NOT CONTAMINATE SAMPLES**;
- Clean water containers;
- Gloves and other relevant PPE;
- Wastewater container;

- Cleaning fluids and cloths in case of contamination of dip tapes; and
- Notebook and pen in case of Toughbook malfunction.

4.4 Leachate Level Monitoring Procedure

- This is to be undertaken AFTER all gas flow and concentration readings have been taken, if they are required.
- Lower the leachate dip-meter probe until the buzzer sounds.
- Raise the probe slowly until the buzzer stops.
- Lower the probe slightly until the buzzer just begins to sound, i.e. measure on the activation of the buzzer when lowering the probe
- Read the level of leachate below the datum point (cover level) from the tape and enter the result into the **Dip** field on the Water Level sheet in EDGE. Check this dip on the hydrograph that shows the past 1 year's data (current dip is shown in red). Check that the dip looks sensible. If it does not, repeat the dip and update if necessary.
- Lower the probe to the base of the borehole and enter the level below the datum point into the **Plumb** field in EDGE.
- If the leachate well is DRY do NOT enter a value in the Dip column, but instead put a Tick in the Tick if Dry column, and enter the measured depth of well in the Plumb field
- Remove from borehole.
- Save the EDGE file before moving onto the next location.

4.5 Leachate Sampling Procedure

- Check the monitoring location and reference number and select the correct location in EDGE.
- Note anything unusual about the monitoring location, e.g. damage. Record this in the remark field of the EDGE field sample form, and in the **Activities** worksheet. If appropriate take a photograph of the damage, upload the photograph to EDGE and associate it with the location.
- The bottles should have pre-registered labels fixed to the bottles in most circumstances. If not, label the sample bottle and clearly write the sample code onto the label. The sample code must be the same as on the Field Samples sheet, Sample Code column given in EDGE.
- Measure the level of leachate in the monitoring well using dip meter (see above).
- Check if dedicated Waterra tubing is in the well, if not, use bailer.
- The Edge Field Samples sheet will show what type of purging, IF ANY, is required in the Method column e.g. BAILED. WATX1. If the given instruction is not possible for any reason, amend the Method column to the method used, and put a comment in the Sample Comments column to say why the method was changed.
- Take Field readings (pH, Temperature, Electrical Conductivity) with the Field Pen from the sample in the bucket before sampling into the sample bottles.
- **There may be a number of different bottles to be filled. Check that you have all the sample bottles for that location (as shown on the ALS COC – see Section 3.2) and**

that they all have the correct sample code on the pre-registered label that corresponds with the SAMPLE_ID in the Field Samples worksheet in Edge.

- If field filtering is required by the laboratory, filter the sample directly into the sample bottles that do require filtering.
- Where there is no fixative wash out the sample bottles twice with water from the leachate monitoring point to clear out any dust or other matter, and to "coat" the bottle with the sample
- In each case continue to fill each bottle until completely full and overflowing (except for samples with fixatives). Firmly close the bottle cap ensuring that the bottle does not contain any headspace (especially vials for volatiles).
- Enter sample details into the Field Samples Form in EDGE, complete all required columns. The date and time will default to the current date and time – check these are correct. Enter Field Pen readings.
- Enter a description of the sample e.g. its odour and colour, and anything unusual such the presence of foreign bodies etc and record in the appropriate field.
- Replace dedicated tubing in the well, replace gas tap, re-secure the borehole and move to next position and repeat.
- Complete any remaining **Activities** questions on the worksheet in Edge before moving to the next location.
- See Section 3.6 for samples not taken and use of qualifiers.

4.6 Sample Storage and Delivery

Place the sample bottles into cool box. Sample temperature must be maintained below 10 ºC.

When all sampling has been completed (groundwater, surface water, leachate) use the EDGE Chain of Custody Manager to create the electronic Chain of Custody. Make sure each sample required for testing is selected along with each determinand group required and assign the schedule. This normally will entail adding Scheduled Samples to the COC in which case the determinand groups will already be available. Check the COC instructions in the Edge User Manual if in doubt.

Export the eCOC and check that it is correct. Print off the chain of custody from the portable printer to accompany the samples to the laboratory, see example presented in Appendix 3. Once back at the office, email the COC to the laboratory and the Cemex data managers for backup (see Section 6 for e-mail addresses) ENSURING that the Company name CEMEX and site name are included in the email subject.

Ensure that the courier is booked to collect samples on the same day as they are taken. Or arrange to deliver the samples to a collection hub on the day of sampling.

Before leaving Site, make a note in the Field Samples tab in EDGE to record the date/time the samples are to be collected by the laboratory. If you are present when the samples are collected ensure that the person receiving completes the chain of custody record and retain a signed copy.

5 SURFACE WATER

5.1 Surface Water Monitoring and Sampling Procedure - General

Ensure that any sample taken is representative of the water flowing within the watercourse.

Ensure that the sample is not contaminated by the sampling procedure.

A safe system of work should be observed; personnel must wear protective clothing and not smoke in the vicinity of the monitoring point.

5.2 Pre-Sampling Procedures (in advance of site visit)

- Cemex staff are responsible for ordering the required pre-registered bottles and arranging with the laboratory (ALS) to have them delivered in good time to a location agreed with Enitial, this may be the site, the technicians home address, or other.
- When the bottles have been delivered, as soon as possible before the site visit, check the correct bottles have been delivered and that the pre-printed labels have the correct sample codes. There will be a laboratory Chain of Custody (COC) form with the delivery, see an example ALS Coventry COC in Appendix 2. Each sample is shown on the COC. Against each sample in the column headed “ALS containers” there is a box containing a list of numbers representing the bottle type references required for that sample. Appendix 1 shows a photograph of each of the bottle types referred to, so that you can match the number and type of bottles for each sample. **If any bottles are missing inform Cemex immediately**.
- It is Enitial’s responsibility to ensure a courier has been booked to collect the samples on the same day they are taken, either from the site, technician’s home or deliver them to a collection centre.
- Check the battery life of each instrument & the field computer is sufficient for the sampling round.

5.3 Monitoring Equipment

- Appropriate pre-registered sample bottles with any necessary preservatives / filtration equipment and instructions;
- Graduated bucket;
- Long-armed bailer;
- Waterproof markers;
- Panasonic Toughbook running the Earthsoft EDGE software (fully charged) and with spare fully charged batteries;
- Field Pen – for monitoring pH, EC and temperature plus calibration fluids; and,
- Gloves and other relevant PPE.
- Notebook and pen in case of Toughbook malfunction.

5.4 Surface Water Level Monitoring Procedure

Surface water levels may be measured in one of two ways generally – taking a dip with a dipper from a fixed point to the level of the water. This may be from a marked point on a bridge, foot bridge, pontoon over the water or metal stake, or it may be through reading off a scale on a gauge board that has been installed for that purpose by Cemex or by others e.g. the EA.

Where a dip reading is taken it is entered in the Dip column on the Water level sheet in the Edge file, and then as the Plumb column is a MUST FILL field, you should enter a ZERO in the Plumb column. Dip is entered in the Dip or Elevation column.

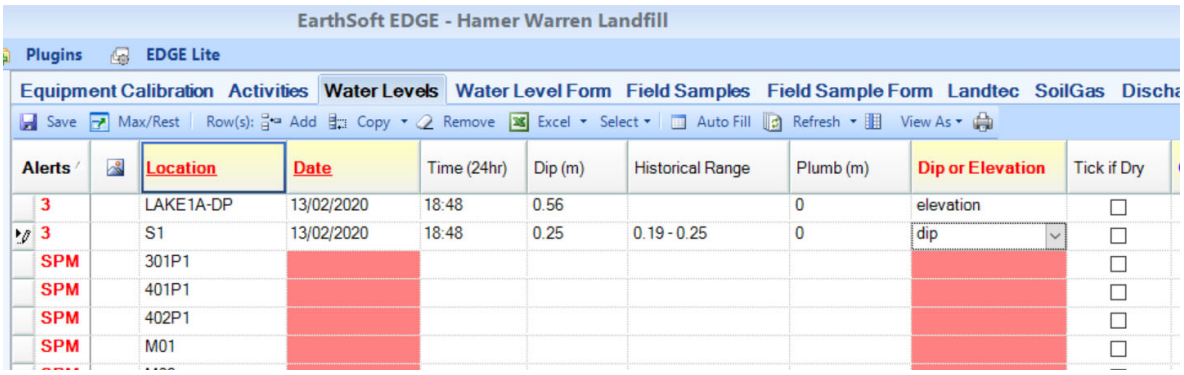
If the dip location is DRY do NOT enter a value in the Dip column, but instead put a Tick in the Tick if Dry column. Enter a ZERO in the Plumb field

Where readings are taken from a gauge board, if the zero of the gauge board is at the base of the board (i.e. the graduations increase in value up the board and the zero is under water) then the reading on the gauge board is entered in the **Dip** column of the Edge sheet – but Elevation is entered into the Dip or Elevation column. You should also enter a ZERO in the Plumb column.

If the water level is either below the zero point on the gaugeboard or above the top of the gaugeboard, no value should be entered in the dip column. It should be entered as DRY – with a tick in the Dry column if the reading is below the gaugeboard, and it should have a Qualifier of UW for underwater if above the gaugeboard.

In the rare case that a gauge board has graduations increasing down the board the measure should be treated as if it were a dip, and the reading measure down from the datum at the top. In this case the reading would be entered into the Dip column, and a Dip entered into the Dip or Elevation field. Again, you should enter a zero into the Plumb field

See example below where LAKE1A-DIP is a gauge board, and S1 is a surface water dip from the top of a metal stake.



5.5 Surface Water Sampling Procedure

- Check the monitoring location and reference number and select the correct location in EDGE.
- Note anything unusual about the monitoring location and note the level of water flowing within the watercourse. Record this in the remark field of the EDGE field sample form. If appropriate take a photograph of any feature of interest such as damage, or where there is a specific request in the Activity tab for photographs upload the photograph to EDGE and associate it with the location.

- The bottles should have pre-registered labels fixed to the bottles in most circumstances. If not, label the sample bottle and clearly write the sample code onto the label. The sample code must be the same as on the Field Samples sheet, Sample Code column given in EDGE.
- **There may be a number of different bottles to be filled. Check that you have all the sample bottles for that location (as shown on the ALS COC – see Section 3.2) and that they all have the correct sample code on the pre-registered label that corresponds with the SAMPLE_ID in the Field Samples worksheet in Edge.**
- Take the sample with long armed bailer or other safe method of sampling that ensure a safe distance from the watercourse or water body is maintained.
- Take Field readings (pH, Temperature, Electrical Conductivity) with the Field Pen from the sample in the bailer before sampling into the sample bottles.
- If field filtering is required by the laboratory, filter the sample directly into the sample bottles that do require filtering.
- Where there is no fixative wash out the sample bottles twice with water from the surface water to clear out any dust or other matter, and to "coat" the bottle with the sample water.
- In each case continue to fill each bottle until completely full and overflowing (except for samples with fixatives). Firmly close the bottle cap ensuring that the bottle does not contain any headspace (especially vials for volatiles).
- Enter sample details into the Field Samples Form in EDGE, complete all required columns. The date and time will default to the current date and time – check these are correct. Enter Field Pen readings.
- Enter a description of the sample e.g. its odour and colour, and anything unusual such the presence of foreign bodies etc and record in the appropriate field.
- Complete any remaining **Activities** questions on the worksheet in Edge before moving to the next location.
- See Section 3.6 for samples not taken and use of qualifiers.

5.6 Sample Storage and Delivery

Place the sample bottles into cool box. Sample temperature must be maintained below 10 ºC.

When all sampling has been completed (groundwater, surface water, leachate) use the EDGE Chain of Custody Manager to create the electronic Chain of Custody. Make sure each sample required for testing is selected along with each determinand group required and assign the schedule. This normally will entail adding Scheduled Samples to the COC in which case the determinand groups will already be available. Check the COC instructions in the Edge User Manual if in doubt.

Export the eCOC and check that it is correct. Print off the chain of custody from the portable printer to accompany the samples to the laboratory, see example presented in Appendix 3. Once back at the office, email the COC to the laboratory and the Cemex data managers for backup (see Section 6 for e-mail addresses) ENSURING that the Company name CEMEX and site name are included in the email subject.

Ensure that the courier is booked to collect samples on the same day as they are taken. Or arrange to deliver the samples to a collection hub on the day of sampling.

Before leaving Site, make a note in the Field Samples tab in EDGE to record the date/time the samples are to be collected by the laboratory FOR ALL SAMPLES BEING COLLECTED BY THE COURIER and that appear on the CoC. If you are present when the samples are collected ensure that the person receiving completes the chain of custody record and retain a signed copy.

6 FIELD DATA UPLOAD TO EQUIS & E-MAILING DATA TO CEMEX, ENITIAL AND ALS

Once in a location with internet connection, start EDGE and import GA5000 gas data for the relevant site.

Connect the GA5000 to the Toughpad, go to DEVICES / Landtec in Edge and find the gas file. You will be prompted to select a Task Code, so select the relevant Gas Task Code from the list.

Once the data has imported to the Landtec worksheet in Edge, complete the gas data importation by adding the Technician Name to the imported data on the Landtec. This can be done using AutoFill. BUT MAKE SURE that this is the only field ticked to be updated.

When all data for the day has been imported and saved in Edge. Create a zip file of all of the data by going to Edge/Home/EDP Export.

That zip file, plus the Edge xls raw data file, and the gas csv file must be e-mailed as soon as possible on the same day as sampling to: -

cemex@equisonline.com

cemexdata@enitial.co.uk

kevin.wilson@cemex.com

Annette.Symonds@cemex.com

Karen.magee@cemex.com

Sue.cullum@ext.cemex.com

If the Edge zip file has been accepted into the Equis Database you will receive two e-mails from cemex@equisonline.com to say it has firstly been delivered and passed initial checks, and then secondly that it has been accepted.

If the Edge file has been rejected, you should receive a Rejection e-mail with an error file attached explaining the reason the file has been rejected. Where possible you should address these problems in the Edge xls raw data file, rezip and re-send the data.

If you do not receive any response it will mean that there is another type of error, e.g. a USR file problem. You will be contacted by one of the Cemex data managers to try to resolve this.

The Edge COC file must be e-mailed on the same day as sampling, as soon as work is complete, with a subject that includes Company name CEMEX and the site name, to: -

SamplesCoventry.UKEnviro@alsglobal.com

Meera.dass@alsglobal.com

cemexdata@enitial.co.uk

kevin.wilson@cemex.com

Annette.Symonds@cemex.com

Karen.magee@cemex.com

Sue.cullum@ext.cemex.com

APPENDIX 1

USUAL ALS Coventry SAMPLE CONTAINERS

BOTTLE	DETAILS	PRESERVATIVE	SAMPLING TECHNIQUE	ANALYSIS
STL 13 	**TYPE** BOTTLE **LID** WHITE **HEIGHT (mm)** 240 **WIDTH (mm)** 75 **DEPTH (mm)** 75 - **FILL LEVEL** LID **REFRIGERATE?** YES	None	This chemistry sample should be taken first unless an RDT metals bottle is required	**General Inorganics, Metals excluding Mercury** One full container is required **CIP Inorganics** One full container is required
STL 22 	**TYPE** BOTTLE **LID** WHITE **LINER** PTFE **HEIGHT (mm)** 145 **WIDTH (mm)** 58 **DEPTH (mm)** - - **FILL LEVEL** SHOULDER **REFRIGERATE?** YES			**Chlorate, Chlorite, Bromate, Bromite, Bromide** One full container is required **Free & Total Chlorine** One full container is required
STL 23 	**TYPE** BOTTLE **LID** RED **LINER** NO **HEIGHT (mm)** 140 **WIDTH (mm)** 70 **DEPTH (mm)** - **SHELF LIFE (mth)** 3 **FILL LEVEL** TOP **REFRIGERATE?** NO	2ml 50% Manganese Chloride solution & 2ml Alkaline Iodide-Azide solution **Dissolved Oxygen sampling instructions** **MSDS 5** **MSDS 6**	Carefully fill the bottle with sample with minimum aeration • Place the stopper in the bottle to displace air and excess liquid, and then remove the stopper	**Dissolved Oxygen** One full container is required

			• Add 2ml manganese chloride solution followed by 2ml Alkaline Iodide-Azide solution to each, dispensing the reagents just below the liquid surface • Carefully replace the stopper, avoiding inclusion of air bubbles and mix thoroughly	
STL 33 	**TYPE** BOTTLE **LID** WHITE **LINER** PTFE **HEIGHT (mm)** 155 **WIDTH (mm)** 55 **DEPTH (mm)** - **SHELF LIFE (mth)** - **FILL LEVEL** TOP **REFRIGERATE?** YES	None		**Pesticides to include Phenols, Acid Herbs, Organochlorines, Organophosphorus, Triazines and Moths** One full container is required **EH/PAH** One full container is required **NVM/Oils** One full container is required **EPH** One full container is required **Alkyl Phenols** One full container is required **TPH/PAH/EPH (Environmental)** One full container is required **Carbonates** One full container is required **Nitrobenzene** One full container is required

				Oil and Grease One full container is required **Glycols** One full container is required **CIP Pharmaceuticals Suite 1** One full container is required
STL 51 	**TYPE** VIAL **LID** GREEN **LINER** SEPTA **HEIGHT (mm)** 100 **WIDTH (mm)** 28 **DEPTH (mm)** - **SHELF LIFE (mth)** 6 **FILL LEVEL** TOP **REFRIGERATE?** YES	0.5ml Hydrochloric Acid (50% v/v) solution **MSDS 10**	• The vials are date stamped and must be used by the expiry date shown • Do not rinse • Ensure no headspace or air bubbles • Ensure that the seal is correctly in place inside the lid with the PTFE coated side in contact with the sample liquid • Two identical sample vials must be taken for each sample	**VOC** Two full vials are required **BTEX/MTBE** Two full vials are required **VPH** Two full vials are required **Solvents** Two full vials are required YWS bottle code: 40ML_CL_VL
STL 17	**TYPE** BOTTLE **LID** WHITE **LINER** PTFE **HEIGHT (mm)** 191 **WIDTH (mm)** 80 **DEPTH (mm)** - **SHELF LIFE (mth)** - **FILL LEVEL** TOP **REFRIGERATE?** YES	None		**Herbicides/Tins to include Acid Herbicides, PCP, Organotins, Sub Ureas and SVOCs** One full container is required **Metaldehyde** One full container is required **Herbs/Tins (Environmental)** One full container is required

				
ALS026 	**TYPE** BOTTLE **LID** WHITE **LINER** PTFE **HEIGHT (mm)** 94 **WIDTH (mm)** 39 **DEPTH (mm)** - **SHELF LIFE (mth)** 7 **FILL LEVEL** NECK **REFRIGERATE?** NO	0.3ml of 0.0167M Potassium Bromate-Bromide solution and 0.3ml of 36.5-38% Hydrochloric Acid solution **MSDS 9**	• The bottles are date stamped and must be used by the expiry date shown • Remove lid only just before sampling • Fill bottle slowly • Do not rinse	**Mercury Environmental** One full container is required
STL 71	**TYPE** POT **LID** WHITE **LINER** NO **HEIGHT (mm)** 70 **WIDTH (mm)** 35 **DEPTH (mm)** - **SHELF LIFE (mth)** 6	3ml of 1M Sodium Hydroxide solution **MSDS 2**	• The bottles are date stamped and must be used by the expiry date shown • Do not rinse	**Total and Free Cyanide** One full container is required YWS bottle code: CN_BOTTLE

	**FILL LEVEL** TOP **REFRIGERATE?** YES				
STL 101 	**TYPE** BOTTLE **LID** WHITE **LINER** NO **HEIGHT (mm)** 185 **WIDTH (mm)** 65 **DEPTH (mm)** 65 **SHELF LIFE (mth)** - **FILL LEVEL** TOP **REFRIGERATE?** YES	None		**Physicals and Inorganic Analysis – Peerless system** One full container is required **Suspended Solids/TDS** One full container is required **General Inorganics -** One full container is required **Dissolved Metals** One full container is required **Filtered Metals** One full container is required **CIP Exactive Suite** One full container is required Yorkshire Water only: bottle used for transportation of STL51 vials.
STL 24	**TYPE** BOTTLE **LID** WHITE **LINER** PE **HEIGHT (mm)** 115 **WIDTH (mm)** 45 **DEPTH (mm)** -	None		**Potable PFOS** One full container is required *Subcontracted* **Nitrification, Resp Inhibition** One full container is required **Reactive Aluminium**	

	**SHELF LIFE (mth)** - **FILL LEVEL** SHOULDER **REFRIGERATE?** YES			One full container of filtered sample is required **Low level metals** Four full containers are required – 2 for Total and 2 for Filtered
STL 97 	**TYPE** BOTTLE **LID** WHITE **LINER** PE **HEIGHT (mm)** 115 **WIDTH (mm)** 45 **DEPTH (mm)** - **SHELF LIFE (mth)** 6 **FILL LEVEL** SHOULDER **REFRIGERATE?** NO	4.0ml of 50% (v/v) Hydrochloric Acid solution **MSDS 10**	• Do not rinse	**Ferrous/Ferric Iron** One full container is required

APPENDIX 2

Example ALS Laboratory Chain of Custody Form (COC) delivered with empty bottles to Cemex

NB: TO PROCESS YOUR REQUEST, A FULLY COMPLETED CHAIN OF CUSTODY IS REQUIRED WITH EACH DELIVERY OF SAMPLES.

Bottle List : 177202

Chain of Custody

CUSTOMER:	Cemex
NAME:	Ms Annette Symonds
TEL NO:	01932 583644
FAX NO:	01932 568933
EMAIL:	annette.symonds@cemex.com

CUST. SERVICES:	Meera Dass
TEL NO:	02476 856 510
EMAIL:	meera.dass@alsglobal.com
ADDRESS:	ALS Environmental Ltd: Torrington Avenue Coventry TEL:+44 (0)24 7642 1213, FAX:+44 (0)24 7685 6575

TAG HEADER(S): G7247977 — ENTER ONE TAG HEADER FROM EACH SHEET OF STICKERS YOU USE

PROJECT NUMBER:	9170
PROJECT NAME:	Barrington
PROJECT LOCATION:	BTN - Barrington
YOUR JOB REF:	REQUIRED FOR AGS
PURCHASE ORDER:	67778
AGS: N	EQuIS: Y / N SHEET 1 OF: 3

SECTION 1

Write non-standard matrix codes here E.g. WO = Wood Chippings (Max description 20 characters)

SAMPLES

SECTION 2

	EXAMPLE	1	2	3	4	5	6	7	8	9	10
Sample Description / (AGS) Borehole ID	Tower Block 6	BTN1/0108/11/1 9/A /	BTN1/02 08/11/19/A /	BTNABH308/11/ 19/A /	BTNBH308/11/ 19/A /	BTNBH17/108/1 1/19/A /	BTNBH17/208/1 1/19/A /	BTNBH2/0208/1 1/19/A /	BTNBH6A08/11/ 19/A /	BTNBH90/108/1 1/19/A /	BTNBH90/208/1 1/19/A /
Sample Date and Time	12/12/08 10:52	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm
Matrix: Code from list / Hazardous: Y/N	GR N	Code N	Code N	Code N	Code N	Code N	Code N	Code N	Code N	Code N	Code N
(AGS) Base Depth - Top Depth (metres) OR NG Depth	1.2 0.89										
(AGS) Sample Type / Borehole Type	Env Water / Trial Pit	/	/	/	/	/	/	/	/	/	/
Analytical Groups *ALS Containers (fill completely)	3	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers
CEMEX - Subcontract (101, 24)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CEMEX - Liquid Analysis (ALS026, NONE, *13, 17, 23, 33, 51, 71, 97)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WRITE ADDITIONAL ANALYSIS HERE											
WRITE ADDITIONAL ANALYSIS HERE											
WRITE ADDITIONAL ANALYSIS HERE											
WRITE ADDITIONAL ANALYSIS HERE											
WRITE ADDITIONAL ANALYSIS HERE											
WRITE ADDITIONAL ANALYSIS HERE											

TICK BOX IN GRID TO REQUEST ANALYSIS (PRINTED ON LIST)

FILL ALL BOTTLES REQUIRED (TL CODES NEXT TO ANALYSIS)

WRITE NUMBER (YELLOW BOX) ON CONTAINER STICKER E.G. "1"

PUT STICKER(S) ON SAMPLE CONTAINER(S)

SECTION 3

MATRIX CODES:
AG = Aggregate
AF = Asbestos Fibres in Air
BM = Bulk Material
CP = Calcium Phosphate Ore
CA = Coal
CK = Coke
CS = Colliery Spoil
DW = Drinking Water
OS = Dust

Customer's delivery of samples constitutes acceptance of ALS Environmental Ltd terms and conditions. If the Customer, suspects that any samples may contain substances hazardous to human health, it shall notify ALS Environmental of its suspicions prior to delivery of any such samples.

WHITE COPY = RETURN TO ALS. PINK COPY = KEEP FOR YOUR RECORDS.

*Fill containers each time requested. Except 1kg soil pot (81) and 1 litre PET (13), only fill one per sample.

Samples *given* to ALS by: WRITE NAME SIGN dd / mm / yy hh : mm

Samples *received* on behalf of ALS: WRITE NAME SIGN dd / mm / yy hh : mm

SECTION 4

NB: TO PROCESS YOUR REQUEST, A FULLY COMPLETED CHAIN OF CUSTODY IS REQUIRED WITH EACH DELIVERY OF SAMPLES.

Bottle List : 177202

ALS Environmental

Chain of Custody

TAG HEADER(S): G7247977 — CUT ONE TAG HEADER FROM EACH SHEET OF STICKERS YOU USE

PROJECT NUMBER: 9170
PROJECT NAME: Barrington
PROJECT LOCATION: BTN - Barrington

SHEET 1 OF: 2

SECTION 1

CUSTOMER:	Cemex
NAME:	Ms Annette Symonds
TEL NO:	01932 583644
FAX NO:	01932 568933
EMAIL:	annette.symonds@cemex.com

CUST. SERVICES:	Meera Dass
TEL NO:	02476 856 510
EMAIL:	meera.dass@alsglobal.com
ADDRESS:	ALS Environmental Ltd: Torrington Avenue Coventry
	TEL:+44 (0)24 7642 1213, FAX:+44 (0)24 7685 6575

Write non-standard matrix codes here E.g. WO = Wood Chippings (Max description 20 characters)

SAMPLES

SECTION 2

	EXAMPLE	11	12	13	14	15	16	17	18	19	20
Sample Description / (AGS) Borehole ID	Tower Block 6	BTNBH90/408/1 1/19/A /	BTNBH91/1A08/ 11/19/A /	BTNBH912A08/1 1/19/A /	BTNBH97/208/1 1/19/A /	BTNBH97/308/1 1/19/A /	BTNL108/11/19/ A /	BTNL2408/11/19 /A /	BTNLE08/11/19/ A /	BTNLW08/11/19/ A /	BTNPYSUMP08/ 11/19/A /
Sample Date and Time	12/12/08 10:52	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm
Matrix: Code from list / Hazardous: Y/N	GR / N	Code / N	Code / N	Code / N	Code / N	Code / N	Code / N	Code / N	Code / N	Code / N	Code / N
(AGS) Base Depth - Top Depth (metres) OR NG Depth	1.2 / 0.89										
(AGS) Sample Type / Borehole Type	Env Water / Trial Pit	/	/	/	/	/	/	/	/	/	/
Analytical Groups / *ALS Containers (fill completely)	3	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers
CEMEX - Subcontract (101, 24)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CEMEX - Liquid Analysis (ALS026, NONE, *13, 17, 23, 33, 51, 71, 97)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
WRITE ADDITIONAL ANALYSIS HERE											
WRITE ADDITIONAL ANALYSIS HERE											
WRITE ADDITIONAL ANALYSIS HERE											
WRITE ADDITIONAL ANALYSIS HERE											
WRITE ADDITIONAL ANALYSIS HERE											
WRITE ADDITIONAL ANALYSIS HERE											

TICK BOX IN GRID TO REQUEST ANALYSIS (PRINTED ON LEFT)

FILL ALL BOTTLES REQUIRED (TL CODES NEXT TO ANALYSIS)

WRITE NUMBER (YELLOW BOX) ON CONTAINER STICKER E.G. "1"

PUT STICKER(S) ON SAMPLE CONTAINER(S)

SECTION 3

MATRIX CODES:
AG = Aggregate
AF = Asbestos Fibres in Air
BM = Bulk Material
CP = Calcium Phosphate Ore
CA = Coa
CK = Coke
CS = Colliery Spoil
DW = Drinking Water
DS = Dus

Customer's delivery of samples constitutes acceptance of ALS Environmental Ltd terms and conditions. If the Customer, suspects that any samples may contain substances hazardous to human health, it shall notify ALS Environmental of its suspicions prior to delivery of any such samples.

WHITE COPY = RETURN TO ALS. PINK COPY = KEEP FOR YOUR RECORDS.

*Fill containers each time requested. Except 1kg soil pot (81) and 1 litre PET (13), only fill one per sample.

SECTION 4

Samples *given* to ALS by: WRITE NAME / SIGN / dd / mm / yy hh : mm

Samples *received* on behalf of ALS: WRITE NAME / SIGN / dd / mm / yy hh : mm

NB: TO PROCESS YOUR REQUEST, A FULLY COMPLETED CHAIN OF CUSTODY IS REQUIRED WITH EACH DELIVERY OF SAMPLES.

Bottle List : 177202

Chain of Custody

ALS Environmental

TAG HEADER(S): AFFIX ONE TAG HEADER FROM EACH SHEET OF STICKERS YOU USE

G7247977

PROJECT NUMBER: 9170
PROJECT NAME: Barrington
PROJECT LOCATION: BTN - Barrington

SHEET 1 OF: 3

CUSTOMER:	Cemex
NAME:	Ms Annette Symonds
TEL NO:	01932 583644
FAX NO:	01932 568933
EMAIL:	annette.symonds@cemex.com

CUST. SERVICES:	Meera Dass
TEL NO:	02476 856 510
EMAIL:	meera.dass@alsglobal.com
ADDRESS:	ALS Environmental Ltd: Torrington Avenue Coventry TEL:+44 (0)24 7642 1213, FAX:+44 (0)24 7685 6575

SECTION 1

SAMPLES

SECTION 2

Write non-standard matrix codes here E.g. WO = Wood Chippings (Max description 20 characters)	EXAMPLE	21	22	23	24	WRITE NO.	WRITE NO.	WRITE NO.	WRITE NO.	WRITE NO.	WRITE NO.
Sample Description / (AGS) Borehole ID	Tower Block 6	BTNS2508/11/19 /A /	BTNS2608/11/19 /M /	BTNSY08/11/19/ A /	BTNVGW08/11/ 19/A /	Sample / Hole ID	Sample / Hole ID	Sample / Hole ID	Sample / Hole ID	Sample / Hole ID	Sample / Hole ID
Sample Date and Time	12/12/08 10:52	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm	dd/mm/yy hh:mm
Matrix: Code from list / Hazardous: Y/N	GR / N	Code / N	Code / N	Code / N	Code / N	Code / Y/N	Code / Y/N	Code / Y/N	Code / Y/N	Code / Y/N	Code / Y/N
(AGS) Base Depth - Top Depth (metres) OR NG Depth	1.2 / 0.89					Base m / Top m	Base m / Top m	Base m / Top m	Base m / Top m	Base m / Top m	Base m / Top m
(AGS) Sample Type / Borehole Type	Env Water / Trial Pit	/	/	/	/	Sample / Hole Type	Sample / Hole Type	Sample / Hole Type	Sample / Hole Type	Sample / Hole Type	Sample / Hole Type
Analytical Groups / *ALS Containers (fill completely)	3	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers	No. Of Containers
CEMEX - Subcontract / 101, 24	✓				✓						
CEMEX - Liquid Analysis / ALS026, NONE, *13, 17, 23, 33, 51, 71, 97		✓	✓	✓	✓						
WRITE ADDITIONAL ANALYSIS HERE											
WRITE ADDITIONAL ANALYSIS HERE											
WRITE ADDITIONAL ANALYSIS HERE											
WRITE ADDITIONAL ANALYSIS HERE											
WRITE ADDITIONAL ANALYSIS HERE											
WRITE ADDITIONAL ANALYSIS HERE											

TICK BOX IN GRID TO REQUEST ANALYSIS (PRINTED ON LEFT)

FILL ALL BOTTLES REQUIRED (STL CODES NEXT TO ANALYSIS)

WRITE NUMBER (YELLOW BOX) ON CONTAINER STICKER E.G. "1"

PUT STICKER(S) ON SAMPLE CONTAINER(S)

MATRIX CODES:
AG = Aggregate
AF = Asbestos Fibres in Air
BM = Bulk Material
CP = Calcium Phosphate Ore
CA = Coal
CK = Coke
CS = Colliery Spoil
DW = Drinking Water
DS = Dust

SECTION 3

Customer's delivery of samples constitutes acceptance of ALS Environmental Ltd terms and conditions. If the Customer, suspects that any samples may contain substances hazardous to human health, it shall notify ALS Environmental of its suspicions prior to delivery of any such samples.

WHITE COPY = RETURN TO ALS. PINK COPY = KEEP FOR YOUR RECORDS.

*Fill containers each time requested. Except 1kg soil pot (81) and 1 litre PET (13), only fill one per sample.

Samples *given* to ALS by:	WRITE NAME dd / mm / yy hh : mm	SIGN
Samples *received* on behalf of ALS:	WRITE NAME dd / mm / yy hh : mm	SIGN

SECTION 4

APPENDIX 3

Example Cemex COC created by Edge to be returned with samples to the laboratory

COC ID:	20200403-1956	TURNAROUND TIME:	RUSH:

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO	
Facility Name	Pendean Quarry			Lab Name	Australian Laboratory Services			Email Invoice To	
Project Number				Lab Contact	Meera Dass			Invoice Reports	
Department				Email				Email Report To	
Address	Off Oaklands Lane			Address	STS Business Centre			Email Reports	
	Pendean				Torrington Avenue			Shipping Company	
City	Midhurst	State		City	Coventry	State		Tracking Number	
Postal Code	GU29 0ER	Country	United Kingdor	Postal Code	CV4 9GU	Country	United K	Cooler Count	
Phone Number				Phone Number	024 7642 1213			Cooler Description	
Project Manager				Quote Number				Sampler 2	
Email Address				PO Number				Sampler 3	

SAMPLE DETAILS									ANALYSIS REQUESTED												Filtered - F: Field, L: Lab, FL: Field & Lab, N: None
									FIL												
									PRESERV.												
									ANALYSIS	PEN_Q_WG	PEN_Q_WS										
Sample ID	Start Depth	End Depth	Depth Unit	Field Matrix	Date	Time (24hr)	G=Grab C=Comp	# Of Cont.													
PENGW1306/04/20/Q			m	WG	2020/04/02	09:43	G			X											
PENW1106/04/20/Q			m	WG	2020/04/02	09:22	G			X											
PENWOB206/04/20/Q			m	WG	2020/04/02	10:19	G			X											
PENWM106/04/20/Q			m	WS	2020/04/02	11:32	G				X										
												X	X								

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME

NB OF BOTTLES RETURNED/DESCRIPTION				
	Sampler's Name		Mobile #	
	Sampler's Signature		Date/Time	

APPENDIX 4

FID Survey Procedures

MONITORING SURFACE EMISSINS – FID SURVEY

Following the "Guidance for Monitoring Landfill Gas Surface Emissions" (Environment Agency, 2010), surface emissions monitoring by way of a FID survey will be undertaken. The purpose will be to demonstrate whether there are any inadequacies in the gas containment and collection system.

Survey of Site

1. Background data relating to the Site will be gathered from CEMEX and gas contractors;

2. The Site's major characteristics will be identified at the outset;

3. Based on a Site plan the landfill will be divided into a number of zones dependent on the cap properties;

4. Prior to the walkover survey any major faults in the gas management system will be identified and rectified.

5. Prior to the walkover survey the general weather conditions will be noted including barometric pressure, recent precipitation, wind speed and direction. Also, the nature of areas adjacent to the survey will be noted e.g. activities that may emit gas or lead to gas migration.

6. The Site walkover survey will be conducted with a flame ionisation detector (FID) or similar. The sample probe will be held as close to the surface (<5cm) as possible. Theair at head height will periodically be sampled (to enable distinction of surface emissions from the landfill from other potential upwind sources). Zones identified in thedesk study will be traversed in a systematic manner, typically along regular lines 50m apart on a permanent cap and 25m apart from a temporary cap. These distances will be reduced where failures in the containment of gas are more likely. In addition, the walkover survey will be directed by observations of the surface, methane emissions measured and secondary factors such as odour. Where high concentrations of methane are detected, the survey will deviate to locate the likely source of the emission. Care will be undertaken when taking measurements in the vicinity of heavyplant, as the unburnt hydrocarbons in diesel exhausts will register on the FID and givepotentially misleading results;

7. The survey will also aim to identify, if present;

    a. Surface cracking or fissures;

    b. Stressed vegetation;

    c. Interfaces between capped zones;

    d. Landfill edges and side slopes;

e. Gas wells and monitoring points;

f. Junctions in gas collection pipe work;
g. Pathways where pipework may be buried in trenches; and

h. Leachate sumps, towers, risers and other monitoring points.

8. Where the survey identifies locations with particularly high emissions, these will be marked with paint or poles for attention during subsequent remedial work. It is noted that many fluorescent survey paints are very high in VOCs and will give misleading results for several days if sprayed directly on the landfill surface;

9. If the survey demonstrates the cap is not consistent and there are discrete features emitting substantial amounts of landfill gas, remedial action is required as soon as possible; and

10. The Site survey and subsequent remedial action will continue until the concentration of methane in air is:

    a. Less than 100 ppmv immediately above the surface on the main zones of thecap; and

    b. Less than 1000 ppmv close to any discrete features.